REMARKS / DISCUSSION OF ISSUES

The present amendment is submitted in response to the Office Action mailed July 20, 2009. In view of the amendments above and the remarks to follow, reconsideration and allowance of this application are respectfully requested.

Status of Claims

Claims 1-20 are pending in the application. Claims 1-2, 4, 6, 8-12, 14 and 16-20 were amended.

The Invention

Prior to addressing the substantive issues, it is instructive to briefly review the invention.

Applicant's invention is directed to an improved addressing method and associated system for activating an electrophoretic display with a rapid drawing update mode. Recent developments and commercialization of bi-stable monochromatic electrophoretic display technology point to the need for improved addressing schemes that enable faster drawing and typing modes with a smoother image update process. Current monochromatic electrophoretic display systems require about 400 milliseconds to reach fully black or white levels, and thus are too slow for active drawing or typing applications where update times need to be closer to the rate of 100 milliseconds. For example, a typing rate of ten keystrokes per second requires 100 millisecond updates for each new letter. Input devices such as a touch screen or keyboard could control active drawing or typing applications.

Drawing and typing applications need relatively short display update times, and the visibility of the drawing and typing should be nearly immediate. In order for typing or drawing on a display to be visually acceptable to the viewer, operational update rates for drawing or typing onto a monochromatic electrophoretic display need to increase to an update rate of several times higher than that of the fastest normal image update mode and to provide a smooth, improved-perceptional image update process with reduced flicker.

Therefore, the invention provides an improved addressing method and associated system for updating electrophoretic displays with lower latency for more interactive

applications such as drawing or typing where relatively quick visual response and feedback are necessary.

I. Claim Rejections under 35 USC 102

A. Rejection of Claims 1-3 and 8-20

In the Office Action, Claims 1-3 and 8-20 stand rejected under 35 U.S.C. §102(b) as being anticipated by WO 2003/044765 ("Zehner"). Applicants respectfully traverse the rejections.

Claims 1-3 and 8-15 are Allowable

The Office has rejected claims 1-23 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,823,948 ("Ross") in view of U.S. Patent No. 5,991,728 ("Debusk"). Applicants respectfully traverse the rejections.

Independent Claim 1 has been amended herein to better define Applicant's invention over Zehner. Claim 1 now recites limitations and/or features which are not disclosed by Zehner. Therefore, the cited portions of Zehner do not anticipate claim 1, because the cited portions of Zehner do not teach every element of claim 1. For example, the cited portions of Zehner do not disclose or suggest the elements of claim 1, which recite:

1. An improved addressing method for updating electrophoretic displays with lower latency for use with interactive applications, the method comprising:

a) receiving drawing information for at least one electrophoretic pixel in the electrophoretic display;

b) determining at least one drawing-mode waveform for the at least one electrophoretic pixel in the electrophoretic display based on the received drawing information for the at least one electrophoretic pixel

c) applying the at least one drawing-mode waveform a predetermined number of times to complete an image update onto the at least one electrophoretic pixel in the electrophoretic display; and

prior to the completion of the image update for the at least one electrophoretic pixel at said step (c):

d) receiving drawing information for at least one additional electrophoretic pixel in the electrophoretic display,

e) determining at least one drawing-mode waveform for the at least one additional electrophoretic pixel in the electrophoretic display based on the received drawing information for the at least one additional electrophoretic pixel in the electrophoretic display;

f) applying the at least one drawing-mode waveform a predetermined number of times to complete an image update onto the at least one additional electrophoretic pixel in the electrophoretic display.

In the Office Action, the Examiner cites Zehner at page 55, third paragraph for allegedly teaching a fast update mode and a slow update mode in an electro-optic display. Zehner teaches at page 55, third paragraph: any areas of an image which are monochrome are simply updated with a single pulse, either black to white or white to black, as part of the overall updating of the display. Zehner further teaches at page 55: the maximum time for rewriting monochrome areas is one-half of the maximum time for rewriting areas which require gray to gray transitions. Zehner uses this feature for rapid updating of image features such as characters input by a user, drop-down menus, etc. Zehner discloses at page 55, lines 25-27: Thus, a user can have fast updating of input characters, drop-down menus and other user-interaction features of the display seamlessly superimposed upon a slower updating of general grayscale images.

Applicants respectfully submit that the method taught in Zehner for updating an electro-optic display **is different** from the method of the invention for providing relatively short display update times for drawing and typing applications, thus allowing the visibility of the drawing and typing to be nearly immediate. This difference is primarily due to the fact that Zehner **does not** address gray scale transitions of user provided character input for drawing and typing applications. Instead, as discussed above, Zehner considers those portions of the image that include characters input by a user as **monochrome portions of the image** and are **updated with a single pulse**, e.g., black to white or white to black. In other words, the character inputs of Zehner **do not** undergo gray scale transitions.

In contrast to Zehner, the invention takes into account **gray scale transitions of**

character inputs in an electrophoretic display. In this regard, Applicant's invention teaches that an electrophoretic pixel array includes means for receiving drawing information. The drawing information may include keyboard input from a keyboard, a keypad or other character entry device; drawing input from a touch screen, a pen-entry system or other drawing device; pointer input from a mouse, a cursor generator or other pointer input device; image information from a memory device such as a memory stick; or image information up linked from a PC, laptop computer or PDA. Accordingly, steps (a) recites:

a) receiving drawing information for at least one electrophoretic pixel in the electrophoretic display;

Upon receiving the drawing information, the pixel is processed in the following manner:

b) determining at least one drawing-mode waveform for the at least one electrophoretic pixel in the electrophoretic display based on the received drawing information for the at least one electrophoretic pixel

c) applying the at least one drawing-mode waveform a predetermined number of times to complete an image update onto the at least one electrophoretic pixel in the electrophoretic display; and

However, it should be appreciated that prior to completing the image update of the at least one electrophoretic pixel at step (c), drawing information is received for at least one additional electrophoretic pixel at step (d) and a similar process begins for the additional pixel, as recited in steps (e) and (f), respectively. In this manner, latency is reduced by initiating the process for the additional pixel **prior to completing the process for the first pixel**. Zehner does not teach or suggest initiating the process for an additional pixel prior to completing the process for the first pixel.

The method of the invention is illustrated by way of example in the specification with regard to Fig. 4, in which the exemplary word "TRAVEL" is provided as character input to the electrophoretic display. It is shown that the process for completing the respective image updates for each letter of the word is initiated prior to the termination of the process for at least an immediately preceding letter. Further, it is shown that each letter undergoes a gray

scale transition.

This process is repeated here in shortened form for convenience as follows:

Where

W=white

LG= light grey

DG = dark grey

B= black

In a first display update,

the letter "T" transitions from W to LG.

In the second display update,

the letter "T" transitions from LG to DG and

the letter "R" transitions from W to LG.

In the third transition,

the letter "T" transitions from DG to B,

the letter "R" transitions from LG to DG, and

the letter "A" transitions from W to LG.

In the fourth transition,

the letter "R" transitions from DG to B,

the letter "A" transitions from LG to DG, and

the letter "V" transitions from W to LG.

In the fifth transition,

the letter "A" transitions from DG to B,

the letter "V" transitions from LG to DG, and

the letter "E" transitions from W to LG.

In the sixth transition,

the letter "V" transitions from DG to B,

the letter "E" transitions from LG to DG, and

the letter "L" transitions from W to LG.

In the seventh transition,

the letter "E" transitions from DG to B, and

the letter "L" transitions from LG to DG.

In the eighth transition,

the letter "L" transitions from DG to B, and so forth.

In the Office Action, the Examiner further cites Zehner at page 21, third full paragraph, for allegedly teaching image updating conducted in an asynchronous mode. At page 21, Zehner describes a process where a display is undergoing a transition between two images. In the first image, certain pixels are in the process of undergoing transitions in mid-frame, while other pixels are not currently in transition. That is, certain pixels are actively transitioning when a new request is received for a second image. For those pixels that are actively transitioning when a new request is received, the controller applies an algorithm to determine how to reach the new state from a current mid-transition. The algorithm is applied to all of the transitioning pixels **simultaneously**. In other words, while the particular transitions for each pixel may be different depending upon their specific current state at the time of receiving a request for a transition to a second image, the specific and unique algorithms applied to each pixel are applied **at the same time (i.e., simultaneously)** to transition the entire image to satisfy the new request for the second image. Accordinglhy, Applicant's respectfully note that the term "asynchronous" as used in Zehner at page 21 is used in a **different context** than that of the invention. Asynchronous, as used in Zehner, refers to the fact that certain pixels are actively transitioning while others are not. While asynchronous, in the context of the invention, refers to receiving image update information for a first pixel and initiating a process to transition that pixel and **subsequently receiving image update information for a second pixel** and **initiating a second process to transition the second pixel prior to the completion of the transitioning the first pixel.**

The key difference being that the image transition (i.e., from a first image to a second image) disclosed at page 21 of Zehner is directed to general image transformations (i.e., scene transformations) in which all pixels transition simultaneously. Zehner does not teach or suggest asynchronicity in the sense that a first pixel undergoes an image update (i.e., steps 1-c) and prior to its completion, and subsequent to its initiation, a second pixel undergoes an image update (steps d-f), as recited in claim 1.

FIRST PIXEL IMAGE UPDATE

a) receiving drawing information for at least one electrophoretic pixel in the electrophoretic display;

b) determining at least one drawing-mode waveform for the at least one electrophoretic pixel in the electrophoretic display based on the received drawing information for the at least one electrophoretic pixel

c) applying the at least one drawing-mode waveform a predetermined number of times to complete an image update onto the at least one electrophoretic pixel in the electrophoretic display; and

prior to the completion of the image update for the at least one electrophoretic pixel at said step (c):

SECOND PIXEL IMAGE UPDATE

d) receiving drawing information for at least one additional electrophoretic pixel in the electrophoretic display,

e) determining at least one drawing-mode waveform for the at least one additional electrophoretic pixel in the electrophoretic display based on the received drawing information for the at least one additional electrophoretic pixel in the electrophoretic display;

f) applying the at least one drawing-mode waveform a predetermined number of times to complete an image update onto the at least one additional electrophoretic pixel in the electrophoretic display.

Hence, claim 1 is allowable. Claims 2-3 and 8-15 depend from independent Claim 1, which Applicants have shown to be allowable. Accordingly, claims 2-3 and 8-15 are also allowable, at least by virtue of their dependency from claim 1.

Claims 16-20 are Allowable

Independent Claim 16 recites similar subject matter as Independent Claim 1 and therefore contains the limitations of Claim 1. Hence, for at least the same reasons given for Claims 1, Claim 16 is believed to recite statutory subject matter under 35 USC 102(b). Claims 17-20 depend from independent Claim 16, which Applicants have shown to be allowable. Accordingly, claims 17-20 are also allowable, at least by virtue of their dependency from claim 1.

Claims 4-7 are allowable

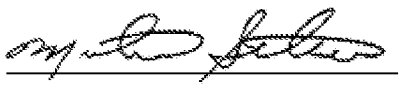
The Office rejects Claims 4-7 as being unpatentable over Zehner. Applicants respectfully traverse the rejections. Claims 4-7 depend from independent Claim 1, which Applicants have shown to be allowable. Accordingly, claims 4-7 are also allowable, at least by virtue of their dependency from claim 1.

Conclusion

In view of the foregoing amendments and remarks, it is respectfully submitted that all claims presently pending in the application, namely, Claims 1-20 are believed to be in condition for allowance and patentably distinguishable over the art of record.

If the Examiner should have any questions concerning this communication or feels that an interview would be helpful, the Examiner is requested to call Mike Belk, Esq., Intellectual Property Counsel, Philips Electronics North America, at 914-945-6000.

Respectfully submitted,



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